Small Business Innovation Research/Small Business Tech Transfer

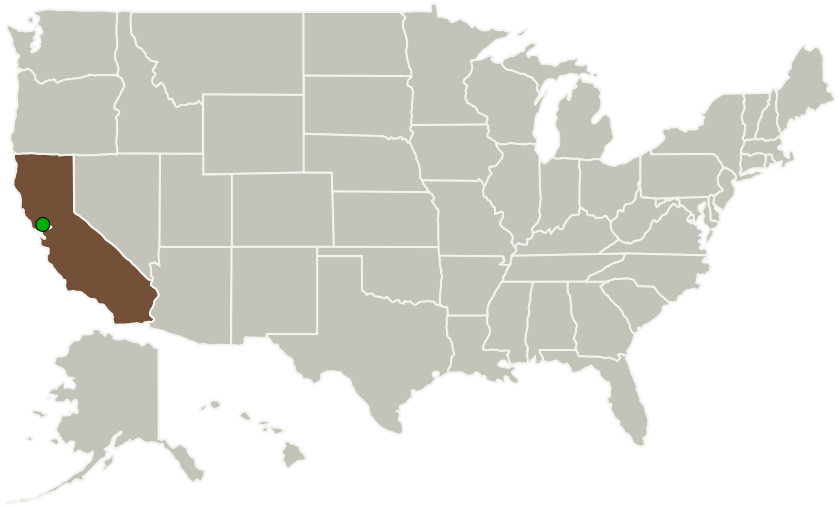
Developing a Certifiable UAS reliability Assessment Approach Through Algorithmic Redundancy, Phase I

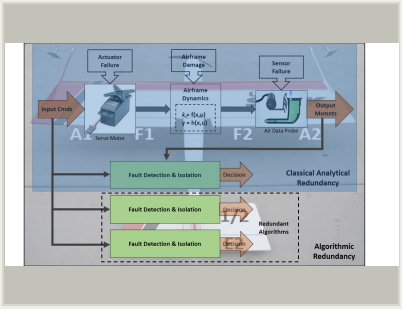
Completed Technology Project (2017 - 2017)

Project Introduction

Manned aircraft, civilian or military, are required to meet certain reliability standards specified by the FAA in order to operate in the US national airspace. These reliability standards are typically met via hardware redundancy. Multiple, dissimilar components of hardware designated for a single purpose increases the physical redundancy and offers a viable way to detect and correct for hardware malfunctions. Unmanned Aircraft Systems (UAS) are often subject to weight/power constraints and therefore unable to accommodate similar redundancies. A common approach to solving this problem has been to employ analytical redundancy in the form of fault detection and isolation (FDI) algorithms. Although significant breakthroughs have been achieved in increasing UAS redundancies analytically, certification has been challenging. The primary objective of the proposed work is to develop a software architecture for UAS that provides certifiable analytical redundancy. The proposed approach is called algorithmic redundancy, owing to its underlying philosophy of increasing UAS reliability via multiple, dissimilar FDI algorithms. Certification of an algorithmically redundant system relies on well-established methods similar to those for hardware redundant systems. We propose to develop a framework for evaluating and selecting FDI algorithms, combining them to build algorithmically redundant software and finally, assess the overall reliability for certification

Primary U.S. Work Locations and Key Partners





Developing a certifiable UAS reliability assessment approach through algorithmic redundancy, Phase I Briefing Chart Image

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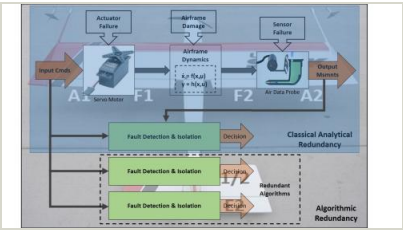
Organizations Performing Work	Role	Type	Location
Systems Technology, Inc	Lead Organization	Industry	
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Images



Briefing Chart Image
Developing a certifiable UAS reliability assessment approach through algorithmic redundancy, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/130057)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Systems Technology, Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

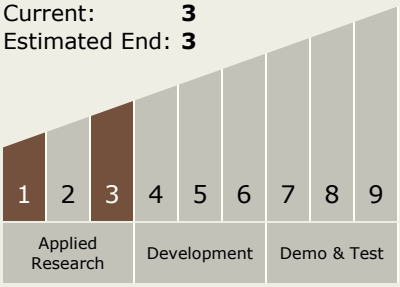
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Brian P Danowsky

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.3 Motion Planning